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# BOOKMOBILE SERVICE IN NORTH CAROLINA:

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# A PROFILE

By: John W. Jones

1979

NC Department of Cultural Resources
Division of State Library
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Raleigh, North Carolina 27611

# BOOKMOBILE SERVICE IN NORTH CAROLINA: A PROFILE

A Research Report
Presented to
the Faculty of the School of Library Science
North Carolina Central University

In Partial Fulfillment
of the Requirements for the Degree of
Master of Library Science

by
John W. Jones

July, 1978

## FOREWORD

The Department of Cultural Resources, Division of State Library, is pleased to publish *Bookmobile Service in North Carolina: A Profile* by John W. Jones. Bookmobile service continues to be an important means of reaching library patrons who cannot avail themselves of regular service because of geography or lack of transportation. It is hoped that this study will help libraries in North Carolina gain insight into the problems and rewards of this service.

Mr. Jones is to be commended for his careful research. Our "thanks" to him for allowing this publication with Library Services and Construction Act, Title I funds.

The North Carolina State Library
April, 1979.

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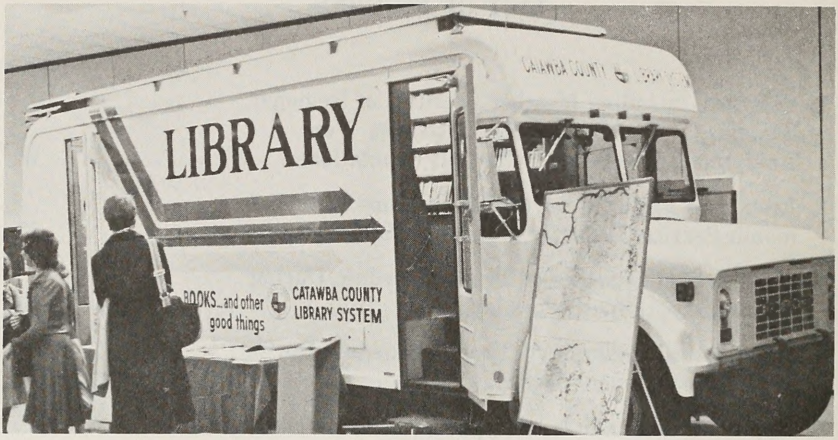
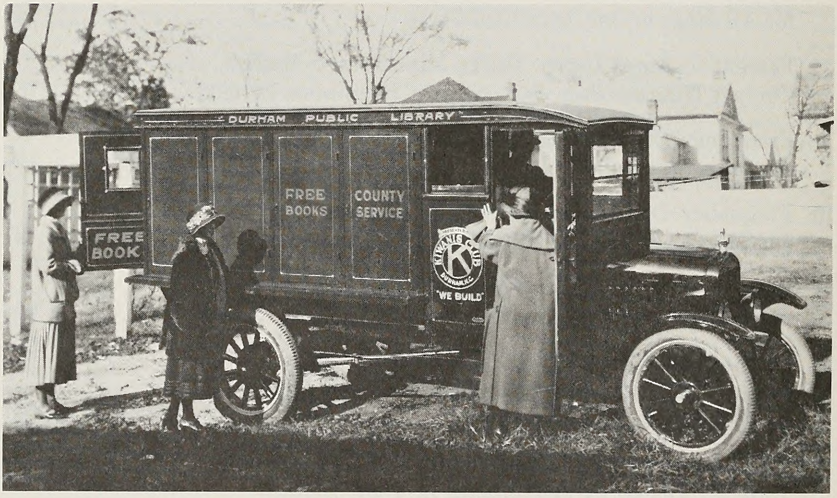


Catawba County Library System, 1978.



Durham County "Book Auto," 1923.

*(Photographs supplied by N. C. State Library.)*

## THE PROBLEM AND ITS SETTING

Public libraries, like many other tax-supported agencies, are being forced with increasing frequency to justify their continued existence, service by service and dollar by dollar, in the vigorous competition for public funds. Bookmobile services seem to be especially vulnerable to cost pressures: three North Carolina library systems have discontinued the service within the past year because of cost, and "Gerstenslager for sale" notices are common in the national professional exchanges.

It is neither surprising nor inappropriate for bookmobile costs to be closely scrutinized, when the initial capital outlay for equipment alone approaches the $50,000 mark. Yet the bookmobile continues to afford a unique avenue for library services, enabling a system to provide face-to-face service at a maximum number of sites convenient to the user without the commitment to numerous permanent branches. A bookmobile has the flexibility to reach relatively immobile or distant segments of the community, to test potential branch locations, to discontinue a fruitless service locale rapidly—in short, to follow its audience rather than attempt to draw it.

Yet bookmobile services will sink or swim according to the degree of objectivity used in their management and justification. Lacking adequate tools for analyzing the various elements involved in the service, the manager's alternatives may be limited to showing that input costs have been kept to a minimum and then hoping that the cost per output will not seem excessive when compared to other services, inside or outside the library. Thus far, few tools and little comparative data have been available to allow library management and funding sources to concretely assess the operating efficiency of bookmobile services, so that they may be continued, improved, or displaced on the basis of measurable criteria.

Thus, this study is prompted by the fundamental premise that bookmobile service is, and will continue to be, a viable alternative for the delivery of library services, and a critical element in the ability to provide adequate service in some communities. The basic hypothesis is that there are measurable features of bookmobile service, *per se,* which are functions of the design and management of the service and are relatively independent of the urban or rural character of the environment it serves. This will be tested in a preliminary way by applying selected measurable indicators to existing bookmobile services and by deriving preliminary empirical norms for these services in North Carolina.

The study will examine and profile bookmobile services throughout North Carolina in terms of the time utilization shown in official bookmobile schedules, will explore the relationship of scheduling to the service output in terms of circulation, and will compare these empirical results to certain standards, norms, and assertions which have previously been made with little or no research basis. In particular, the study will quantitatively show:

- The proportions of time spent in travel, contact with the public, and other activities, as reflected in the bookmobile schedule itself;

- Relationships which may exist between the time in contact with the public and the rate of materials circulation; and
- The degree to which travel time and circulation rate are linked to the urban or rural character of the area served.

The profiles and normative data developed in this study are expected to provide a useful context for individual libraries to view certain aspects of their bookmobile services in comparison to a statewide mean figure or to individual libraries operating under conditions similar to their own. However, the scope of the study is insufficient to support any "standards" by which operations may be externally judged and none should be inferred. Most specifically, there has been no effort to characterize the quality nor even the overall content of the services studied, apart from gross circulation.

Although the measures employed in the study seem to have potential utility in evaluating or improving the cost effectiveness of a bookmobile service, this is not a cost-benefit study and no cost data has been collected or considered.

This study is based almost entirely on data gathered from the *Statistics and Directory of North Carolina Public Libraries, July 1, 1976-June 30, 1977,* which is secondary data, and from printed route schedules provided by the systems operating bookmobiles. Use of these sources necessitates a number of assumptions upon which the validity of the results hinges. It is assumed that:

1. the printed schedules received in May and June of 1978 are sufficiently similar to the schedules followed one year earlier that any relationships observed between the schedule studied and the circulation reported for 1976-77 can be considered meaningful;
2. the printed schedule is followed 52 weeks a year, without seasonal changes, periods out of service for maintenance, or other variations, and that it implies all public service and travel time; and
3. the circulation data reported to the State Library is accurate and compatible with data reported by other systems, despite variations in the period of circulation or in statistical procedures used by different systems, such as counting or not counting renewals.

Certain other assumptions are implicit in the working definitions used within the study:

BOOKMOBILE: A mobile unit which circulates print materials at a regular pattern of locations within defined geographic limits. (This excludes mobile units used only for film showings, story hour programs, and other such functions.)

CIRCULATION: The figure reported to the State Library, without regard to the type of material loaned, local statistical procedures, or other variations.

CONTACT TIME: That period of time during which the bookmobile is in place and open to the public to provide library services, as shown on, or inferred from the printed schedule. (See the Methodology for inferential procedures used.)

CYCLE: A scheduling period which encompasses all bookmobile service locations and travel patterns, and which is repeated indefinitely to generate continuous, regular operation.

DEPARTMENTAL OPERATING TIME: That span of time during which staff is regularly scheduled to perform duties related to the operation of the bookmobile service, irrespective of the number of persons on duty at any given time. Departmental operating time is comparable to the business hours of an office, and does not measure the man-hours invested in the service. Where staff performed multiple roles, only that time assigned to the bookmobile was counted.

POPULATION DENSITY: Number of persons per square mile. For counties, data was taken directly from *Profiles of North Carolina Counties* (1977 edition); for regional systems, the mean population density for the counties within the region was computed by summing the populations for those counties and dividing by the total land area of those counties in square miles.

RURAL: In this study, the term refers to any geographic area whose overall population density is less than the mean population density for the entirety of North Carolina. Rural library (or system) refers to a library charged to serve a rural area, thus defined.

TRAVEL TIME: That period of time during which the bookmobile is closed to the public while preparing to, or actually moving from one location to another, as shown on the printed schedule or inferred from it, as described under Methodology, below. Since no schedule showed times for leaving or returning to its home base, this definition clearly omits an indeterminate portion of the actual travel time.

UNACCOUNTED TIME: That portion of the departmental operating time which cannot be allocated to travel time or contact time based on the printed schedule. No negative connotation is implied. The unaccounted time will include time spent in travel to and from the home base, any paid meal breaks, and a variety of maintenance, record-keeping, and other activities.

URBAN: In this study, the term arbitrarily refers to any geographic area whose population density is above the state mean, i.e., the opposite of rural (above).

## REVIEW OF THE RELATED LITERATURE

In order to locate related research, the materials listed under "Bookmobiles" in *Library Literature* (January, 1963 to April, 1978) and in the RIE and CIJE databases were searched. A master's thesis by Barbara Jackson (Catholic University, 1966) thoroughly reviewed published and unpublished works on bookmobiles from 1905 to 1966, and was used to extend the search back to the apparent beginning of bookmobile literature.

Writing on bookmobiles prior to 1970 was largely philosophical, descriptive, or prescriptive. Beginning in the late 1960s, the emphasis began to shift toward research and analysis, specifically cost-benefit studies or cost comparisons between bookmobiles and other delivery systems, such as books-by-mail or branch libraries. Examination of the titles which seemed relevant to the present research served to lend credence to some of its premises and to identify measurements selected for this study as appropriate ones. Some works asserted that there are bookmobile norms or standards, and these will be used later for comparison to the study results. *The PLD Reporter*, Number 14, provided specific background on the management of bookmobile services.

ALA standards of 1963 linked scheduling to service effectiveness by stating that no bookmobile stop should be scheduled for less than thirty minutes (Public Library Association, p. 8). In issues devoted entirely to the bookmobile, *The PLD Reporter* (Number 7, 1958) and *Library Trends* (January, 1961) included support for maximizing contact time.

Circulation per minute criteria were discussed by Wheeler and Goldhor, in their highly respected *Practical Administration of Public Libraries*, a norm of one book circulated per minute of contact time was posed by Eleanor Brown in her work, *Bookmobiles and Bookmobile Service*, and was later supported by Teh-wei Hu and others in *A Cost Benefit Analysis of Alternate Delivery Systems*.

A number of works supported the use of circulation as the prime output measure for bookmobile service, by demonstrating that circulation is the clearly dominant activity actually performed in bookmobiles, despite attempts in past decades to ascribe a social function to bookmobile service. Notable support was found in the Washington State Library's *Simulation Model for Library Planning* (1975) and in Diane Friese's "Rural Bookmobile Service Versus Books-by-Mail in the Maritime Provinces."

The search produced only one report which indicated that a prior study similar to the present one may have been done. Eleanor Brown, in *Bookmobiles and Bookmobile Service* (p. 107), reported that a study of 123 bookmobiles in Texas showed that 94% of that study population operated with over 50% contact time and that 69% exceeded 60% contact time. Brown did not cite the source of this information and a repeated search of the literature for the likely period of publication yielded no means of tracing the original study.

Thus, while at least one study with some similar elements has apparently been done, no concrete guidance or previous model for this particular study was found in the literature.

## METHODOLOGY

### The Survey Population and Response

With the intention of collecting data on every public library bookmobile operating in North Carolina, a mailing list was drawn from the *Statistics and Directory of North Carolina Public Libraries: July 1, 1976-June 30, 1977*, which indicated that 57 systems operated bookmobiles. On April 27, 1978, a letter (Appendix I-A) was mailed to all 57 systems, requesting schedule and circulation information on their bookmobile service. Self-addressed stamped envelopes were enclosed with the request so that information could be returned at no cost to the responding system.

The first mailing produced 39 replies, of which 28 were usable, according to the criteria described below. Three replies indicated that their systems no longer operated a bookmobile service, leaving a survey population of 54 systems. A follow-up request (Appendix I-B) was mailed on May 15 to the 18 systems which had not yet replied and a request for clarification (Appendix I-C) was sent on the same date to the eight systems which had sent unusable data. These produced 13 replies, of which eight were used. A final mail request was sent on June 1 to the 13 systems for which data was still lacking and this effort yielded nine more usable replies.

Assuming that all public library bookmobiles were reported in the state *Directory*, one could say that a 100% response rate was achieved. However, only 45 of the 54 systems (see Figure 1) operating bookmobiles were able to provide usable information, so that the data used represents an 84% rate of usable responses. In two cases, systems which operated three bookmobiles submitted data for only two of their units.

**Figure 2:** Responses from Survey of NC Systems with Bookmobile Services Reported in the State Library Directory.

| | |
|---|---|
| Systems contacted in survey | 57 |
| Systems replying: | |
| No bookmobile operating now | 3 |
| No bookmobile schedule available | 4 |
| With unusable schedule | 5 |
| With usable schedule | 45 |
| TOTAL | 57 |

## Criteria for Using Data and Procedures for Its Interpretation

Schedules for bookmobile routes provided by the systems surveyed were the most important source of data for this study. To be usable, a schedule must allow the actual time open for public service (contact time) and time used for travel between service sites (travel time) to be read directly from the schedule or to be estimated to the nearest five minutes without imposing undue assumptions. Two systems (Onslow and Rutherford Counties) reported partial data directly, rather than submitting a printed schedule, and these were used where possible.

The 48 written schedules in the survey were of four distinct types. Types I, II, and III were considered usable for the purposes of this study. An example of each type is found in Appendix II and labelled by its type, according to the following descriptions.

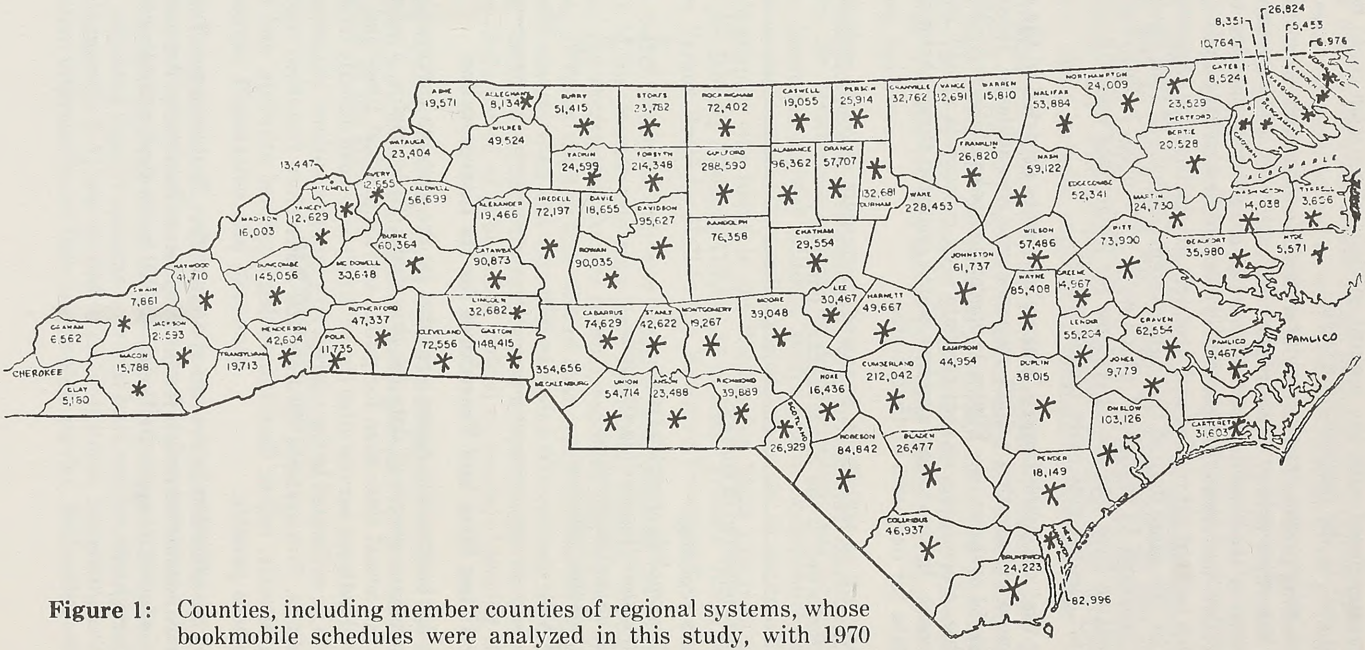


**Figure 1:** Counties, including member counties of regional systems, whose bookmobile schedules were analyzed in this study, with 1970 populations.

* = schedule analyzed and included

TYPE I:

These schedules clearly listed both beginning and ending time for each stop and, therefore, required virtually no interpretation. Of the 29 Type I schedules received, only one showed an official lunch period. Since the other 28 schedules did not show any unusually long times between midday stops, it was assumed that the staff eats lunch while the bookmobile is open for service or in transit.

**Figure 3:** Hypothetical Example of Type I Schedule During an (Assumed) 8-hour Workday.

| | |
|---|---|
| 9:00-11:00 | Southdale Shopping Center |
| 11:15-12:15 | Eastdale Shopping Center |
| 12:30- 1:30 | Smith Home, 105 Water Street |
| 2:00- 3:00 | Johnson Home, 204 Sink Street |
| 3:30- 4:45 | King Recreation Center |

In Figure 3, the Southdale Shopping Center stop shows two hours, or 120 minutes, in contact time; following that stop is a gap of 15 minutes before the next stop begins, which is assigned as travel time. Continuing similarly, the workday shown is found to include six hours and 15 minutes (375 minutes) of contact time and one hour and 30 minutes (90 minutes) of travel time. Subtracting the sum of contact time and travel time from the total departmental operating time of eight hours, leaves 15 minutes as unaccounted time.

| | | | |
|---|---|---|---|
| CONTACT TIME | 6:15 (hours) | or | 375 minutes |
| TRAVEL TIME | 1:30 | | 90 |
| UNACCOUNTED TIME | 0:15 | | 15 |
| DEPARTMENTAL OPERATING TIME | 8:00 | | 480 |

TYPE II:

Eight schedules provide full data as in Type I, except that a space of 45 to 60 minutes between stops was observed near midday, and this time was not designated for lunch, travel, or both. In order to realistically allocate this time, a subsample of five of these systems were contacted (Onslow County, Rutherford County, Johnston County, Greensboro (Guilford County), and Durham County). Four of these allowed thirty minutes for lunch; the other allowed sixty. The subsample mode of 30 minutes was used as a standard allowance for lunch period on all Type II schedules.

**Figure 4:** Hypothetical Example of Type II Schedule During an (Assumed) 8-hour Workday.

| | |
|---|---|
| 9:00-11:00 | Westgate Shopping Center |
| 11:15-11:45 | Children's Center |
| 12:30- 1:30 | City Rest Home |
| 2:00- 4:00 | City Recreation Center |
| 4:15- 4:45 | Post Office |

Allocation of time to categories for the schedule in Figure 4 would be done as for Type I schedules, except that 30 minutes of the 45 minute gap between the stops at Children's Center and City Rest Home is assumed to be a lunch period and is considered in unaccounted time. This schedule would be analyzed to include:

| | | | |
|---|---|---|---|
| CONTACT TIME | 6:00 (hours) | or | 360 minutes |
| TRAVEL TIME | 1:15 | | 75 |
| UNACCOUNTED TIME | 0:45 | | 45 |
| DEPARTMENTAL OPERATING TIME | 8:00 | | 480 |

TYPE III:

Six schedules specified the time of arrival at each stop but did not indicate a time of departure from any stop, so that the time in contact with the public and the travel time involved in the schedule could not be determined directly from the schedule. In order to maintain a maximum overall sample size, a procedure for rationally estimating these travel times was devised, rather than discarding the data. A trial run was made with the Forsyth County Public Library Bookmobile with stops placed ½ mile apart, a likely minimum distance, and it was found that 4½ minutes were required to close and start the van, drive between stops, and reopen. Therefore, where Type III schedules showed stops beginning no more than 30 minutes apart, a travel time of five minutes was assumed to take place between these stops. This procedure provided the needed breakdown of travel and contact times for almost all stops shown on Type III schedules. For the few stops over 30 minutes apart, a trial mean among all Type I and Type II schedules indicated that an average of 15% of the time between stops was used for travel, and this percentage was assumed to hold for the longer stops on Type III schedules. For the final stop of the day, where no span of time was given, the contact time was assumed to be the average of all of the stops for that day, and travel time was not counted (as with Types I and II). Lunch time was treated as in Type I or Type II, as the schedule pattern indicated. These procedures likely introduce some inaccuracy in the individual schedule analysis, but were selected to minimize residual error in the statewide profile due to Type III data.

**Figure 5:** Hypothetical Example of Type III Schedule During an (Assumed) 8-hour Workday.

| | |
|---|---|
| 9:30 | Smith Home, 105 Sink Street |
| 9:45 | Jones Home, 305 Blue Street |
| 10:00 | King Home, 128 Red Street |
| 10:15 | Queen Home, 603 Fifth Street |
| 10:45 | Wall Home, 305 Ninth Street |
| 11:00 | Brown Home, 220 Main Street |
| 11:45 | White Home, 910 Main Street |
| 12:15 | Black Home, 405 Railway |
| 12:45 | Post Office |
| 1:15 | Elementary School |
| 1:45 | Volunteer Fire Station |
| 2:45 | Blake Farm, Old Mudville Road |

A 30-minute lunch break is assumed between the 11:00 and 11:45 stops. Travel time of 15% (rounded to 10 minutes) would be assigned to the one hour afternoon schedule segments, and travel time of five minutes allowed for all other segments, since none are over 30 minutes. Since the first 11 stops include 235 minutes of contact time, the average of 20 minutes (rounded to the nearest 5 minutes) is assigned as contact time for the final stop.

Interpretation of the schedule in Figure 5 would yield:

| | | | |
|---|---|---|---|
| CONTACT TIME | 4:15 (hours) | or | 255 minutes |
| TRAVEL TIME | 1:05 | | 65 |
| UNACCOUNTED TIME | 2:40 | | 160 |
| DEPARTMENTAL OPERATING TIME | 8:00 | | 480 |

TYPE IV:

Five schedules specified little beyond the location of each bookmobile stop. These schedules were unusable for research purposes and were not considered in the profiles developed in this study.

### Converting Data to Normable Measurements

Data on contact time, travel time, and unaccounted time were compiled to the nearest five minutes for the full schedule on each route in the bookmobile service cycle for each system studied. These were then expressed as percentages of the total departmental operating time in the cycle. This process is demonstrated in Figure 6. Since the full year's bookmobile activity has been assumed to be a continuous repetition of identical cycles, the percentages of departmental operating time invested in contact, travel, and unaccounted time for a cycle also reflects the annual percentage breakdown.

**Figure 6:** Hypothetical Example of Time Analysis for a Bookmobile Service Cycle, in Hours and Percent of Departmental Operating Time.

| | **Contact Time** | **Travel Time** | **Unaccounted Time** | **Departmental Operating Time** |
|---|---|---|---|---|
| ROUTE 1 | 20:40 | 8:10 | 11:10 | 40:00 |
| ROUTE 2 | 20:10 | 8:20 | 11:30 | 40:00 |
| ROUTE 3 | 22:05 | 8:30 | 9:25 | 40:00 |
| ROUTE 4 | 21:05 | 8:00 | 10:55 | 40:00 |
| FULL CYCLE | 84:00 | 33:00 | 43:00 | 160:00 |
| % OF DEPARTMENTAL OPERATING TIME | 52.5% | 20.6% | 26.9% | 100.0% |

The scheduling pattern was also analyzed to determine the degree to which stops of various lengths occur within a cycle. Contact time intervals were set up and both the number and percentage of all stops which fell within each range was listed to show the numerical and relative frequency of occurrence within the cycle. Cumulative relative frequency was used to determine the percentage of stops which were found at or below a given length of contact time. An example of this analysis is shown in Figure 7.

**Figure 7:** Hypothetical Frequency Analysis of Contact Times for All Stops in One Scheduled Cycle.

| CONTACT TIME (in minutes) | FREQUENCY (No. of Stops) | RELATIVE FREQUENCY | CUMULATIVE RELATIVE FREQUENCY |
|---|---|---|---|
| 15 or less | 37 | 17.4% | 17.4% |
| 20 | 43 | 20.2 | 37.6 |
| 25 | 15 | 7.0 | 44.6 |
| 30 | 78 | 36.6 | 81.2 |
| 35 | 1 | .5 | 81.7 |
| 40 | 3 | 1.4 | 83.1 |
| 45 | 6 | 2.8 | 85.9 |
| 50 | 2 | .9 | 86.8 |
| 55 | 0 | 0 | 86.8 |
| 60 | 9 | 4.2 | 91.0 |
| 65 | 1 | .5 | 91.5 |
| 70 | 1 | .5 | 92.0 |
| 75 | 2 | .9 | 92.9 |
| 80 | 1 | .5 | 93.4 |
| 85 | 0 | 0 | 93.4 |
| 90 | 3 | 1.4 | 94.8 |
| 120 | 10 | 4.7 | 99.5 |
| Over 120 | 1 | .5 | 100.0% |
| TOTAL | 213 | 100.0% | |

Circulation per minute was chosen to measure and compare the output rates achieved by the systems studied. This rate was derived by dividing the reported annual circulation of materials by the number of minutes of contact time per year, computed from the previous time analysis data exemplified in Figure 6. Total contact time for the full cycle was converted to minutes, and then divided by the number of weeks in a cycle to yield average contact time per week in minutes, which is multiplied by 52 (weeks) to produce the total minutes per year of contact time. Using the data from Figure 6:

84 hours = contact time per cycle
60 mins. = number of minutes in an hour
4 weeks = number of weeks in a full cycle
52 weeks = number of weeks in one year

$$\frac{84 \times 60}{4} \times 52 = 65{,}520$$

65,520 minutes = annual contact time

If the reported annual circulation were 56,485:

$$\frac{\text{annual circulation}}{\text{annual contact time}} = \text{average circulation per contact minute}$$

$$\frac{56{,}485}{65{,}520} = .86 \text{ circulations per minute}$$

## RESULTS OF THE STUDY

Results are discussed first for two phases of the schedule analysis, which are then linked to the reported circulation and the derived rate of circulation. Urban and rural differences and similarities are discussed within the presentation of the particular results to be compared.

### Scheduled Length of Stops

The first step in the schedule analysis investigated the degree to which stops under 30 minutes were scheduled within the state. The data in Figure 8 show that the systems surveyed had scheduled numbers of stops under 30 minutes which represented a range of zero to 94% of their total stops. The mean for the statewide sample indicates that 35.1% of all scheduled stops fall below the ALA minimum standard length of 30 minutes.

The median contact times per stop in Figure 8 imply that 61.4% (27 out of 44) of the systems scheduled at least half of their stops for 30 minutes or less.

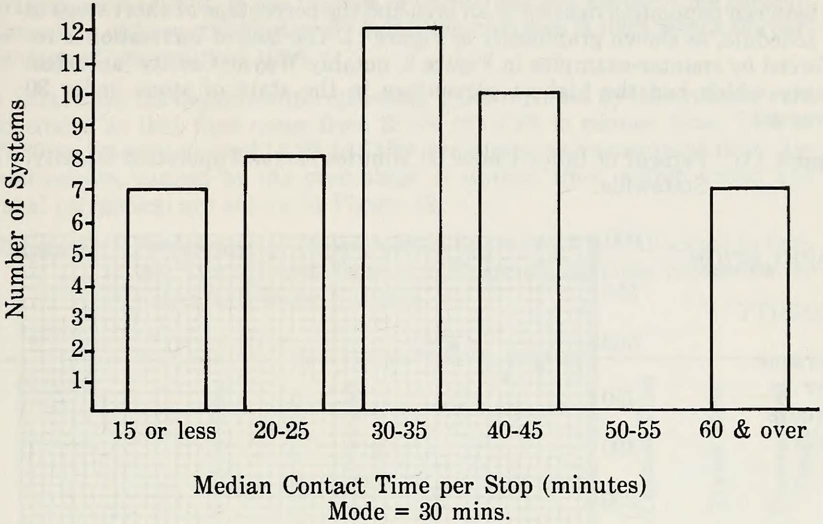
**Figure 8:** Percent of Stops Under 30 Minutes and Median Contact Time per Stop, Statewide by Population Density.

| N = 44 | Population Density | % of Stops with Contact Time Under 30 Minutes | Median Contact Minutes per Stop | | Population Density | % of Stops with Contact Time Under 30 Minutes | Median Contact Minutes per Stop |
|---|---|---|---|---|---|---|---|
| URBAN SYSTEMS: | | | | RURAL SYSTEMS: | | | |
| Forsyth | 573.6 | 0 | 45 | Surry | 103.6 | 48.8 | 30 |
| New Hanover | 496.3 | 16.7 | 40 | Robeson | 99.5 | 34.0 | 30 |
| Durham | 474.1 | 0 | 45 | Union | 97.8 | 2.4 | 60 |
| Guilford | 466.6 | 7.2 | 45 | Scotland | 95.0 | 88.2 | 15 |
| Cumberland | 354.8 | 57.6 | 25 | Hyconeechee* | 93.2 | 31.3 | 30 |
| Gaston-Lincoln | 283.4 | 16.0 | 60 | Harnett | 89.4 | 74.5 | 15 |
| Buncombe | 235.3 | 34.4 | 45 | Johnston | 83.1 | 70.5 | 25 |
| Cabarrus | 220.4 | 0 | 60 | Haywood | 81.1 | 45.0 | 30 |
| Davidson | 186.4 | 2.9 | 30 | Halifax* | 77.5 | 84.2 | 15 |
| Rowan | 185.9 | .9 | 45 | Northwestern | 76.5 | 70.0 | 20 |
| Cleveland | 168.1 | 72.8 | 15 | C.P.C.* | 68.4 | 44.6 | 30 |
| Wayne | 162.2 | 96.4 | 15 | Franklin | 57.8 | 56.5 | 25 |
| Wilson | 161.5 | 0 | 120 | Polk | 54.5 | 1.9 | 60 |
| Chapel Hill | 153.5 | 0 | 45 | Sandhill* | 54.4 | 28.3 | 45 |
| Neuse | 150.3 | 31.5 | 30 | Columbus | 53.7 | 0 | 30 |
| Iredell | 137.1 | 53.1 | 15 | Duplin | 49.3 | 48.5 | 30 |
| Rockingham | 136.6 | 12.8 | 60 | Albemarle* | 38.5 | 18.5 | 30 |
| Onslow | 134.3 | 56.9 | 20 | E. Albemarle** | 37.6 | 13.0 | 40 |
| Pitt | 119.9 | 59.2 | 20 | Brunswick | 37.5 | 4.9 | 60 |
| Nash | 117.7 | 48.1 | 30 | Fontana | 33.5 | 53.4 | 20 |
| Stanly | 112.9 | 0 | 45 | B.H.M. | 32.9 | 68.9 | 15 |
| | | | | Bladen | 32.5 | 74.3 | 20 |
| | | | | Pettigrew | 25.4 | 20.0 | 30 |

* average for two units reported
** average for three units reported

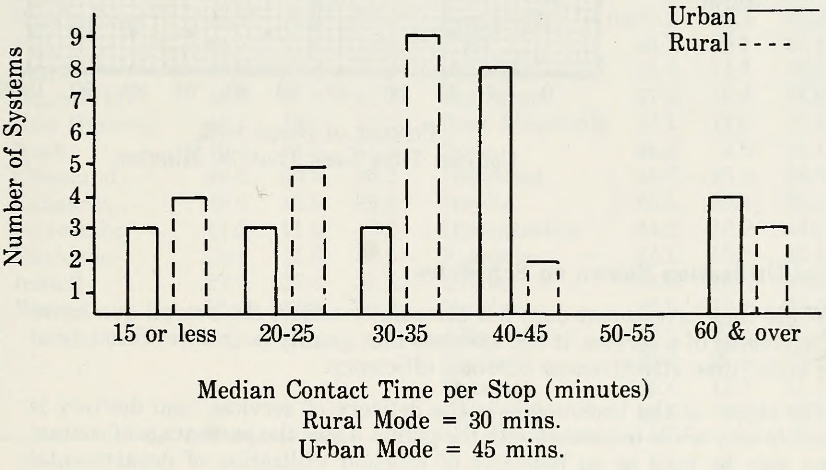
The median contact times from Figure 8 show a limited clustering when considered by intervals. The actual frequency distribution of stop lengths is displayed in Figure 9.

**Figure 9:** Frequency Distribution of Median Contact Time per Stop, Statewide.



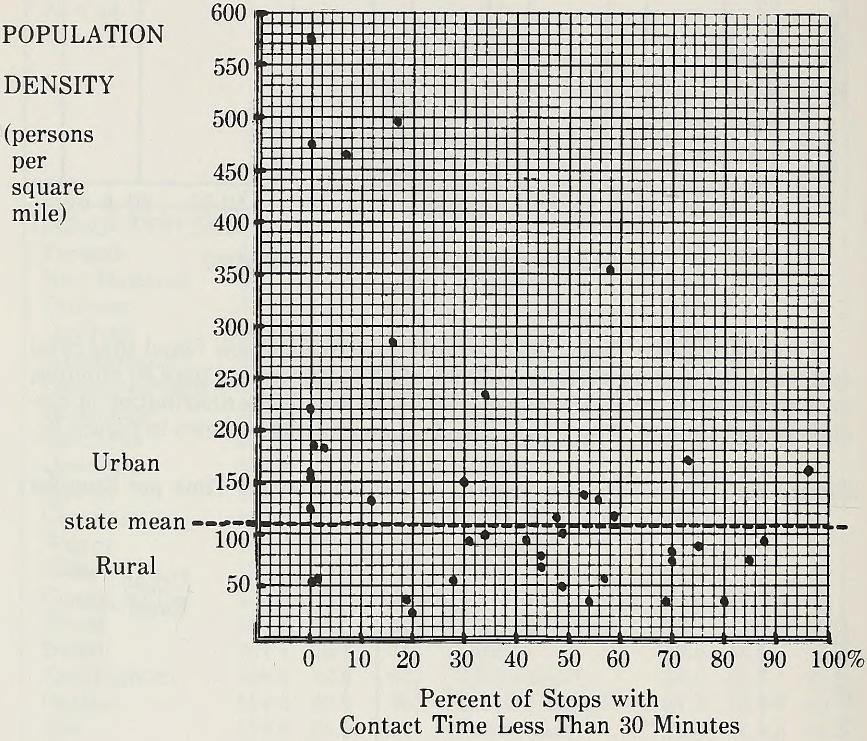
In comparing data from rural and urban systems, it was found that rural systems scheduled an average of 42.6% of all stops for less than 30 minutes, in contrast to an urban average of 27.0%. The frequency distribution of median contact time per stop for rural and urban systems is shown in Figure 10.

**Figure 10:** Frequency Distribution of Median Contact Time per Stop for Urban and Rural Systems.



Although Figure 10 shows some differences between the medians observed in the urban and rural categories, no direct relationship appears to exist between population density in an area and the percentage of short stops in its schedule, as shown graphically in Figure 11. The lack of correlation is reinforced by counter-examples in Figure 8, notably Wayne County (an urban county which had the highest percentage in the state of stops under 30 minutes).

**Figure 11:** Percent of Stops Under 30 Minutes *versus* Population Density, Statewide.



## Time Utilization Shown on Schedules

While time investment does not necessarily reflect the overall quality or effectiveness of a service, if one assumes that quality is uniform throughout the state, then effectiveness becomes efficiency.

The object of the bookmobile is the delivery of services, and delivery is possible only while in contact with the public. Thus, the percentage of contact time may be used as an indicator of efficient utilization of departmental operating time. Travel time is an unavoidable limitation to contact time, occasioned by the nature of the service. Thus, it may be more appropriate, in making comparisons, to use the sum of travel time and contact time percentages as an efficiency indicator. By definition, this sum is 100% minus the percentage of unaccounted time.

Statewide, the departmental operating times reported by the systems were scheduled so that they range from 28.5% to 66.9% in contact time, 7.7% to 27.8% in travel time, and 14.5% to 63.8% remaining as unaccounted time. Actual results, ranked by the percentage of contact time, within urban and rural categories, are shown in Figure 12.

**Figure 12:** Percentages of Departmental Operating Time Allocated as Contact Time, Travel Time, and Unaccounted Time, Statewide for Urban and Rural Systems.

| N = 44 | % Contact Time | % Travel Time | % Unaccounted Time | | % Contact Time | % Travel Time | % Unaccounted Time |
|---|---|---|---|---|---|---|---|
| URBAN SYSTEMS | | | | RURAL SYSTEMS: | | | |
| Neuse | 66.9 | 10.4 | 22.7 | B.H.M. | 64.1 | 21.4 | 14.5 |
| Cumberland | 63.5 | 9.9 | 26.6 | Bladen | 55.9 | 23.6 | 20.5 |
| Wilson | 61.7 | 10.2 | 28.1 | Harnett | 55.8 | 22.1 | 22.1 |
| Gaston-Lincoln | 58.0 | 11.5 | 30.5 | Northwestern | 54.3 | 23.5 | 22.2 |
| Forsyth | 56.9 | 9.3 | 33.8 | Johnston | 53.9 | 9.9 | 36.2 |
| Rowan | 54.4 | 17.9 | 27.7 | Sandhill | 52.8 | 13.0 | 34.2 |
| Durham | 54.2 | 16.5 | 29.2 | Surry | 52.3 | 20.4 | 27.3 |
| Guilford | 48.9 | 15.1 | 36.0 | Rutherford | 50.0 | 18.6 | 31.4 |
| Rockingham | 48.9 | 13.6 | 37.5 | Brunswick | 49.3 | 15.4 | 35.3 |
| Pitt | 48.5 | 17.6 | 33.9 | C.P.C. | 48.7 | 16.9 | 34.4 |
| Stanly | 47.5 | 11.4 | 41.0 | Fontana | 48.4 | 14.7 | 36.9 |
| Chapel Hill | 46.9 | 11.0 | 42.1 | Pettigrew | 47.6 | 18.4 | 34.0 |
| New Hanover | 46.5 | 13.1 | 40.4 | East Albemarle | 47.1 | 17.5 | 35.4 |
| Nash | 46.4 | 11.8 | 41.8 | Polk | 46.3 | 9.6 | 44.1 |
| Cleveland | 45.3 | 20.8 | 33.9 | Haywood | 45.7 | 15.4 | 38.9 |
| Cabarrus | 43.7 | 12.5 | 43.8 | Duplin | 45.1 | 26.4 | 28.5 |
| Buncombe | 41.3 | 11.5 | 47.2 | Hyconeechee | 44.2 | 10.9 | 44.9 |
| Davidson | 38.5 | 15.0 | 46.5 | Franklin | 44.1 | 13.5 | 42.4 |
| Iredell | 37.5 | 27.3 | 35.2 | Union | 44.0 | 18.8 | 37.2 |
| Wayne | 35.9 | 14.9 | 49.2 | Halifax | 43.9 | 19.2 | 36.9 |
| | | | | Albemarle | 42.2 | 21.6 | 36.2 |
| | | | | Scotland | 39.4 | 27.8 | 32.8 |
| | | | | Robeson | 35.4 | 12.7 | 51.9 |
| | | | | Columbus | 28.5 | 7.7 | 63.8 |

The mean percentages of contact time, travel time, and unaccounted time found for the statewide, urban, and rural samples are shown in Figure 13.

**Figure 13:** Mean Contact Time, Travel Time, and Unaccounted Time Expressed as Percentages of Total Departmental Operating Time, Statewide and for Urban and Rural Systems.

| | % Contact Time | % Travel Time | % Unaccounted Time |
|---|---|---|---|
| Urban Mean | 49.6% | 14.0% | 36.4% |
| Rural Mean | 45.6% | 17.5% | 35.1% |
| State Mean | 48.4% | 15.9% | 35.7% |

The means for contact time, travel time, and unaccounted time shown in Figure 13 form a meaningful profile of the time data shown in Figure 12, since the data showed a central tendency to cluster about their means. Standard deviations for the statewide sample: 8.2% for contact time, 5.2% for travel time, and 9.1% for unaccounted time. Standard deviations for urban and rural data were close to those for the state.

Although rural systems were intuitively expected to have significantly higher travel times than urban systems, the representative mean figures do not differ as greatly as was thought. It is also notable that unaccounted time occupies at least twice as much time as travel in all three sample groups and could perhaps be revised to increase contact time by up to 70% of its present level.

## Rate of Circulation

Brown (p. 105) and Wheeler and Goldhor (p. 426) suggest that circulation of one book per minute is an appropriate operating standard. In North Carolina, 16 systems were found to meet or exceed this standard, while 29 systems fell below it. In *The PLD Reporter* of 1958 (p. 22), a somewhat higher standard of 100 books per hour was posed; only two systems in this survey could meet that standard.

Figure 14 shows the percentage of contact times under 30 minutes, the annual circulation, and the rate of circulation found for each of the sample systems. Graphing this data in a manner similar to that in Figure 11 shows no pair-wise correlation between the percentage of stops below 30 minutes and either the annual circulation or the circulation per minute. This indicates that maintaining or not maintaining the ALA standard for minimum stop length has no apparent influence on the quantitative output of bookmobile service, measured in circulation.

Inspection of Figure 14 shows that circulation per minute is not at all constant across the state, ranging from .2 to 3.6 pieces per minute. Since circulation per minute does not appear to be constant, it might intuitively seem

**Figure 14:** Annual Circulation and Circulation per Minute, Statewide, Ranked by Percent of Stops Under 30 Minutes.

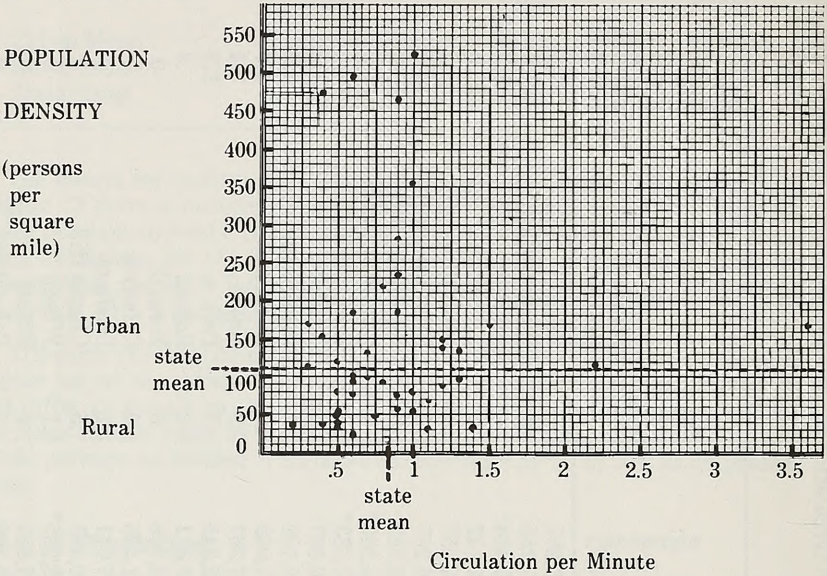
| N = 44<br>Library System | % of stops with Contact Time under 30 minutes | Annual Circulation | Circulation per minute | Library System | % of stops with Contact Time under 30 minutes | Annual Circulation | Circulation per minute |
|---|---|---|---|---|---|---|---|
| Wayne | 96.4 | 26,281 | 1.5 | Neuse | 31.5 | 96,415 | 1.2 |
| Scotland | 88.2 | 17,255 | .6 | Hyconeechee | 31.3 | 41,627* | .8 |
| Halifax | 84.2 | 30,404* | .6 | Sandhill | 28.3 | 16,133* | .5 |
| Harnett | 74.5 | 42,143 | 1.2 | Pettigrew | 20.0 | 32,932 | .6 |
| Bladen | 74.3 | 22,057 | 1.1 | Albemarle | 18.5 | 12,592* | .5 |
| Cleveland | 72.8 | 95,387 | 3.6 | New Hanover | 16.7 | 37,933 | .6 |
| Johnston | 70.5 | 43,862 | 1.0 | Gaston-Lincoln | 16.0 | 40,462 | .9 |
| Northwestern | 70.0 | 34,352* | .9 | East Albemarle | 13.0 | 12,181** | .4 |
| B.H.M. | 68.9 | 51,383* | 1.4 | Rockingham | 12.8 | 46,698 | 1.3 |
| Pitt | 59.2 | 30,367 | .5 | Guilford | 7.2 | 53,369 | .9 |
| Cumberland | 57.6 | 80,182 | 1.0 | Brunswick | 4.9 | 13,320 | .2 |
| Onslow | 56.9 | 51,059 | .7 | Davidson | 2.9 | 44,108 | .9 |
| Franklin | 56.5 | 7,367 | .9 | Union | 2.4 | 57,854 | 1.3 |
| Fontana | 53.4 | 32,345 | .5 | Polk | 1.9 | 52,965 | 1.0 |
| Iredell | 53.1 | 32,871 | 1.2 | Rowan | .9 | 39,870 | .6 |
| Surry | 48.8 | 18,906 | .6 | Forsyth | 0 | 82,254 | 1.0 |
| Duplin | 48.5 | 11,435 | 1.0 | Cabarrus | 0 | 44,373 | .8 |
| Nash | 48.1 | 127,041 | 2.2 | Durham | 0 | 29,589 | .4 |
| Haywood | 45.0 | 30,481 | .5 | Chapel Hill | 0 | 24,746 | .4 |
| C.P.C. | 44.6 | 52,935* | 1.1 | Wilson | 0 | 19,854 | .3 |
| Buncombe | 34.4 | 47,587 | .9 | Stanly | 0 | 19,836 | .3 |
| Robeson | 34.0 | 30,198 | .7 | Columbus | 0 | 18,866 | .5 |

* average for two units

** average for three units

linked to the population density in the service area. That is, circulation might increase with the number of people nearby to use the service, as is presumed in an urban area. The mean circulation per minute was found to differ somewhat: 1.01 pieces per minute for urban systems, .78 among rural systems, and .89 statewide. However, no correlation between population density and circulation per minute is evident in Figure 15 (except the tendency to cluster about the mean for each variable).

**Figure 15:** Population Density *versus* Circulation per Minute.



## Summary of Findings

Schedules show that the "average" bookmobile in North Carolina uses less than half of its time for direct public service, spends 15% of its time in transit, and devotes the balance (about one-third) to other activities. Little relationship was found between the actual figures on stop length (median of 30 minutes) or rate of circulation (mean of .9 pieces per minute) and the authority-based standards posed for them. Circulation could not be linked to the percentages of stops below ALA standard length, to population density, nor to contact time with the public—a puzzling result discussed below. Urban and rural comparisons were equivocal, with some measures differing slightly for the gross categories but having no apparent relationship to the population density used to define urban and rural.

## INTERPRETATION OF THE FINDINGS

This study set out to use certain quantitative management tools to profile North Carolina bookmobile service and, in that process, to discover whether those measurable features were attributable to the nature of the service itself, to its management, or to the environment being served. While the analytic methods used were of limited sophistication, the degree to which service measurements clustered about their mean or median values supported the general validity of the profiles and lent encouragement to the search for broader-based norms for bookmobile services. While the results provide no conclusive answers, some of the questions may have been clarified.

### Travel Time

Tradition has associated the bookmobile with outlying and rural areas and inferred that travel must thus be a major, unavoidable handicap to the efficiency of bookmobile service. Yet this study has shown that less time is actually spent in travel than in "off-the-truck" activities in all but two systems. Thus, while it is not possible to eliminate travel time, it need not and does not pose as large a stumbling block as might be supposed. The schedules studied represent the full spectrum of stop lengths, land areas to be covered, and population densities in the state: yet, if travel time were the only handicap, every system studied could achieve a 75% efficiency rating on contact time to total time. An appropriate focus for additional study would appear to be the content, necessity, and possible reduction of the large unaccounted time segment found in virtually every case.

### Urban and Rural Comparisons

While the data is far from conclusive, the low degree of differences found in urban and rural measurements at least questions whether the intuitive rural disadvantage actually exists. If one assumes that the slight differences seen when areas are merely characterized as urban or rural have significance, then why is the degree of "urban-ness" or "ruralness" i.e., the population density, apparently irrelevant? One response may lie in the actual location of service: using population density as a measure assumes that the bookmobile is actually serving the full area assigned to the system. In actual practice, some rural systems may be serving mainly the urban mini-areas within their districts and, conversely, some urban systems may delegate bookmobile service to their rural outskirts. Whether this exists and whether such practices are appropriate or efficient, remains for future research.

### Outputs and Standards

The ALA standard input of at least 30 minutes per stop to allow "professional service" (presumably beyond circulation) is at philosophical odds with the output criterion of circulating one book per minute, which allows little time for other functions. This study suggests that the input standard does not promote the output standard and, further, that these standards receive little practical application, at least in North Carolina. Studies designed to clarify the roles which can or cannot be feasibly performed by typical bookmobiles, which seek to define measurable and appropriate outputs for those roles, and which clarify a range of inputs which relate to those outputs could well form a basis for standards which are more consistent and more widely used.

### Rate of Materials Circulation

The lack of correlation between circulation and contact time with the public and even the population density points to the importance of other factors as determinants of circulation. Some likely prospects for future investigation are: 1) whether stops are located at sites of popular activity, residences, or elsewhere; 2) whether service is ending too early in the day to reach school children or working adults; 3) whether the collection and services are geared to the interests and needs of the people at the selected service locations; 4) whether schedules are followed reliably enough to hold a regular following; and 5) whether the public is aware of service times and locations. This study touched on the latter possibility during the data collection process, which showed that some systems do not follow a regular schedule and that others have some difficulty in producing a firm, written copy of their schedule for a single researcher and thus, presumably, for the public.

A number of factors may be involved in producing circulation in addition to those mentioned above, and combinations of factors may be effective where single variables are not. Resolution of this question would provide a firm and understandable basis for management and funding justification in bookmobile service, but may require relatively long-term and expensive research methods. A reasonable approach to such answers may be through the use of controlled experimentation, by local managers or funded research teams, in which each measurable factor in the service is varied individually and the results of each change are noted and analyzed separately and then in combination.

### The Statewide Profile

The profile reported in the results section of this study consists of a brief array of means and medians on time utilization and circulation in North Carolina bookmobiles, backed by individual data for systems. The importance of this profile lies not in its extent or its sophistication, but in the fact that no profile has existed before. The goal of the profile is not to support standards or to generate rankings among the operations, but to provide a background against which systems may view themselves.

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# APPENDIX I: SURVEY INSTRUMENTS

John W. Jones
1815 Academy Street
Winston-Salem, NC 27103

Dear Director:

I am a graduate student and in the process of collecting thesis information for the Master's degree in Library Science.

To assist me in my research, would you please send me the following information within the next 10 days.

1. The number of bookmobiles your system operates: __________
2. A current copy of the bookmobile schedule for each bookmobile operated by your system: enclosed ____________________
   not available ____________________
3. The total circulation for each bookmobile unit operated by your system during either the fiscal year 1976-77 or the calendar year, 1977: ______________________________________
4. Is your bookmobile a full-time service (40 hrs. per week)? ____________________ If not, how many hrs. per week? ____________________

I sincerely appreciate your taking time to help me.

Thank you,

John W. Jones

John W. Jones
1815 Academy Street
Winston-Salem, NC 27103

Dear Director:

I recently sent a letter to you requesting help in collecting information for my thesis. To date, I have not received a reply from your library. Since this information is important to me, I am asking for your help again. A copy of my original letter is attached for your use. If you could assist me, I would greatly appreciate it.

Thank you,

John W. Jones

John W. Jones
1815 Academy Street
Winston-Salem, NC 27103

Dear Director:

Thank you for your recent reply to my request for information concerning your bookmobile service. As stated in my previous letter (copy attached), I am a graduate student involved in collecting information for my thesis. While I sincerely appreciate your time and effort in sending me this information, it cannot be used in its present form. If possible I would like to ask for your help one more time. My thesis involves a time analysis for all bookmobiles in North Carolina, therefore, I need clarification of your bookmobile schedule. The type of data I need is as follows:

BOOKMOBILE SCHEDULE

May 1, 15, 29, June 5, 19, etc.

Monday—Eastgate Shopping Center—9:00-10:00 A.M.
Westgate Shopping Center—10:30-11:30 A.M.
Happy Hills Shopping Center—1:00-3:00 P.M.
Main Post Office—3:30-4:30 P.M.

Tuesday— . . . and each day throughout one complete cycle.

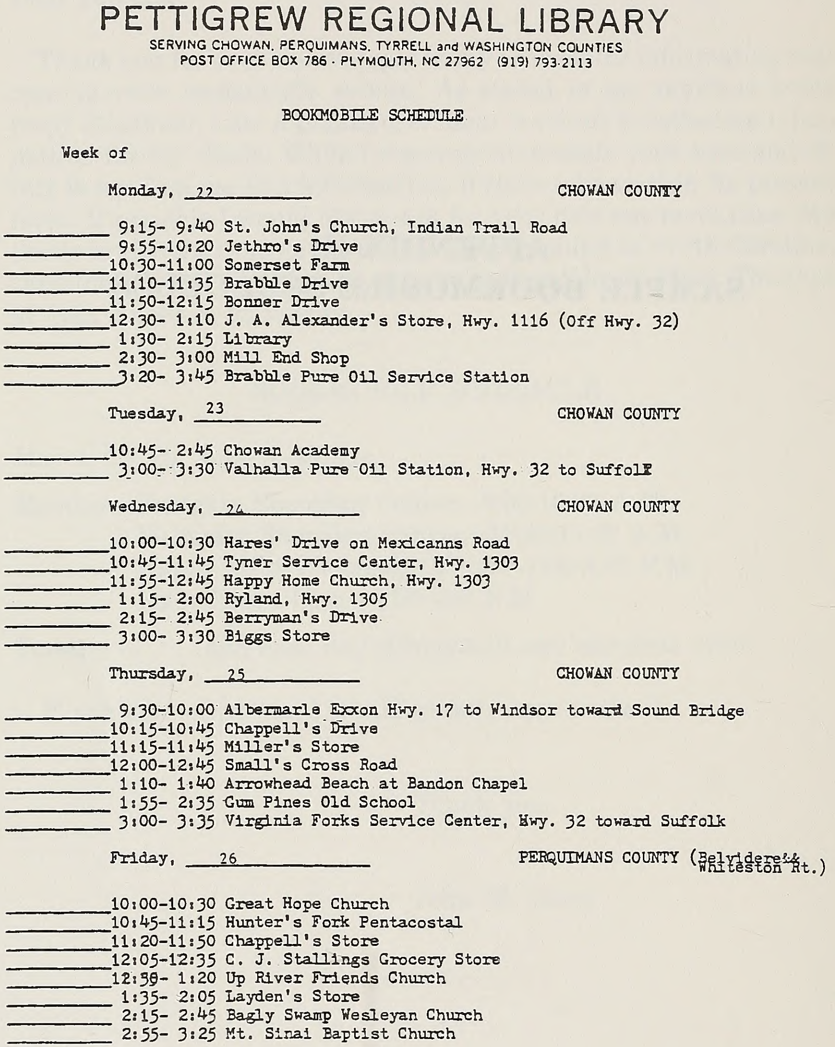
If you can assist me, I would greatly appreciate it.

Thank you,

John W. Jones

# APPENDIX II: SAMPLE BOOKMOBILE SCHEDULES

## APPENDIX II-A
## TYPE I



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BOOKMOBILE SCHEDULE

Week of

Monday, 22 CHOWAN COUNTY

__________ 9:15- 9:40 St. John's Church, Indian Trail Road
__________ 9:55-10:20 Jethro's Drive
__________10:30-11:00 Somerset Farm
__________11:10-11:35 Brabble Drive
__________11:50-12:15 Bonner Drive
__________12:30- 1:10 J. A. Alexander's Store, Hwy. 1116 (Off Hwy. 32)
__________ 1:30- 2:15 Library
__________ 2:30- 3:00 Mill End Shop
__________ 3:20- 3:45 Brabble Pure Oil Service Station

Tuesday, 23 CHOWAN COUNTY

__________10:45- 2:45 Chowan Academy
__________ 3:00- 3:30 Valhalla Pure Oil Station, Hwy. 32 to Suffolk

Wednesday, 24 CHOWAN COUNTY

__________10:00-10:30 Hares' Drive on Mexicanns Road
__________10:45-11:45 Tyner Service Center, Hwy. 1303
__________11:55-12:45 Happy Home Church, Hwy. 1303
__________ 1:15- 2:00 Ryland, Hwy. 1305
__________ 2:15- 2:45 Berryman's Drive
__________ 3:00- 3:30 Biggs Store

Thursday, 25 CHOWAN COUNTY

__________ 9:30-10:00 Albermarle Exxon Hwy. 17 to Windsor toward Sound Bridge
__________10:15-10:45 Chappell's Drive
__________11:15-11:45 Miller's Store
__________12:00-12:45 Small's Cross Road
__________ 1:10- 1:40 Arrowhead Beach at Bandon Chapel
__________ 1:55- 2:35 Gum Pines Old School
__________ 3:00- 3:35 Virginia Forks Service Center, Hwy. 32 toward Suffolk

Friday, 26 PERQUIMANS COUNTY (Belvidere & Whiteston Rt.)

__________10:00-10:30 Great Hope Church
__________10:45-11:15 Hunter's Fork Pentacostal
__________11:20-11:50 Chappell's Store
__________12:05-12:35 C. J. Stallings Grocery Store
__________12:50- 1:20 Up River Friends Church
__________ 1:35- 2:05 Layden's Store
__________ 2:15- 2:45 Bagly Swamp Wesleyan Church
__________ 2:55- 3:25 Mt. Sinai Baptist Church

APPENDIX II-B
TYPE II

**Bookmobile**

Mondays
Rock Ridge: 10:30 to 12:00
Sims: 1:00 to 4:30

Tuesdays
Black Creek: 10:30 to 1:00
Whitfield Homes: 2 to 4:45

Wednesdays
Barnes Grocery: 10:15 to 11:10
Pender's Crossroads: 11:15 to 12:00
Saratoga 1:00 to ~~[illegible]~~ 4:00
Wilson Chapel Apts. 4:15 to 5:15

Thursdays
Food Lane: 2:00 to 5:30
~~Forrest Road [illegible]~~

Fridays
Pittman Drive: 10 to 11
New Hope: 11:15 to 12:30
Forrest Road 1:30 to 4:30

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# APPENDIX II-C
## TYPE III

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Halifax County Library
Box 97
Halifax, North Carolina 27839

Mrs. W. D. Holloman, Jr.
Director

NEW BOOKMOBILE SHCEDULE FOR THE WEEK OF 1978

WEST BOOKMOBILE

MONDAY:
Anderson Cross road, Aurelian Spring, Bowers Cross Rd.
Jean Haksin 9:15, Cindy Shearins 9:35, Gwyn Hockaday 9:55, Ralph Hill 10:15, Linda Liles 10:35, Ruth Aycock 11:00, Lillie Harvey 11:20, Pauline Hawkins 11:40, Joyce Burgress 12:30, Arrington Trailer Ct. 12:55, Mary Jefferson 1:40, Sallie daniels 2:00, Emma Johsnon 2:20, Ethel McRae 2:40, Rosa Boyd 3:00, Butts & Gupton 3:25, Ruby Liles 3:45.

TUESDAY:
King Cross Rd., William R. Davie Area, Thelma, 158 East
Flemming & Morris 9:15, Lucy Pierce 9:35, Clarence Brown 9:55, Carrie Daniels 10:15, Howard Brown 10:35, Elma Etheridge & Stephenson 11:00, Griffin, Huff, & Huester 11:25, Clarissa Shaw 11:45, Meta Wood 12:40, Lundy & Bennett 1:00, Flemming Day Care Center 1:20, Rook's Store 1:45, Pricilla Davis 2:20, Mary Johnson 2:45, 158 Gas Station 3:15, Betty Pair & Clemmon 3:50.

WEDNESDAY:
Littleton, Cooley Cross Rd., Myrick Estate
McCullom & Price 9:30, Helen Robertson 9:50, Lillian Alston 10:10, Dorothy Powell 10:35, Rochelle Area 11:00, Littleton Library 11:30, Wright Store 12:10, Harper & Sommerville 1:10, Cooley 1:30, James King 1:55, Catherine Alston 2:20, Mike Baker 2:45, Nancy Waters 3:10, M. Myrick 3:30, Three Lake. 3:55.

THURSDAY:
48 to Reasville to Zoo Road
Virginia Thomas 9:15, Robin Harrison 9:35, Bryant 10:00, Rev. Graham 10:25, Frances Tucker 10:35, Cieslinski 11:05, Ruble 11:30, Edwards Store 11:50, P & J Trailer Ct. 12:15, Reese 12:45, Keeter 1:05, Polston & Powell 1:30, Salmon 2:00, Daye & Pierce 2:25, Wilson 2:50, Evans 3:10, Buddie Place 3:35, Mrs. Jack Lambeth 4:00.

APPENDIX II-D
TYPE IV

POLK COUNTY PUBLIC LIBRARY
Rt. 1, Box 34
Columbus, North Carolina 28722

## BOOKMOBILE SCHEDULE FOR MARCH 1978

| | |
|---|---|
| March 1 | Saluda Area |
| March 2 | Saluda School & Saluda Nursing Home |
| March 8 | Pea Ridge Area |
| March 9 | Sunny View School, Holbert Cove Rd. & Silver Creek Rd. |
| March 10 | Hickory Grove Area |
| March 14 | St. Lukes Hospital |
| March 15 | Green Creek Area |
| March 16 | Green Creek School & Polk County Workshop |
| March 17 | Tryon # 1 |
| March 22 | Sunny View Area |
| March 23 | Mill Spring School & Stoney Knoll Day Care Center |
| March 24 | Tryon # 2 Area & Lynn Area |

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